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FAILURE COSTS OF GOVERNMENT-REGULATED FINANCIAL FIRMS: THE CASE OF THRIFT INSTITUTIONS

Research Working Paper No. 123

by

James R. Barth, R. Dan Brumbaugh, Jr., and Daniel Sauerhaft

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Editor's Note

This paper is a revised version of a paper with the same title that was made available by the Federal Home Loan Bank Board in conjunction with its regulatory proposal to extend the expiration date of the direct investment regulation by two years. This paper differs in no important substantive way from the earlier version. It simply clarifies technical equations presented in the earlier version as well as provides summary statistics for the estimated equations. All of the data, empirical results, and conclusions are unchanged.

Barth is Professor of Economics at George Washington University. Brumbaugh is President and Chief Executive Officer of Independence Savings and Loan Association, Vallejo, California. Sauerhaft is a graduate student at Columbia University. At the time this paper was written, Brumbaugh and Sauerhaft were employed at the Bank Board's Office of Policy and Economic Research.

ABSTRACT

More than 500 thrift institutions were liquidated or merged by the regulatory authorities during the first half of the 1980s and hundreds more await similar action. Since such closures are frequently costly, it is important to assess not only the likelihood that an institution will fail, but also its likely cost, upon failure, to the insurance fund. This paper, therefore, focuses on the determinants of the cost of failure so as to assess the riskiness to the insurance agency of various activities that have recently come under increased regulatory control as well as to examine the importance of timeliness in closing insolvent institutions. It further examines the relationship between alternative book-value measures of net worth and the cost of failure.

FAILURE COSTS OF GOVERNMENT-REGULATED FINANCIAL FIRMS: THE CASE OF THRIFT INSTITUTIONS

From 1980 through 1985, 581 thrift institutions with assets of $116 billion insured by the Federal Savings and Loan Insurance Corporation (FSLIC) failed.[1] These institutions represented 15 percent of all thrifts existing in 1980, and the cost to the FSLIC to resolve the failures exceeded $5 billion.[2] Although many insolvent institutions were closed by the FSLIC, other insolvent institutions were allowed to remain operating.[3] The number of insolvent but still operating institutions climbed to 462 at the end of 1985 from 17 at the beginning of 1980. Declining insurance reserves relative to the costs of disposing of the assets of the growing number of failed institutions is frequently cited as a major reason why not all insolvent institutions have been closed.[4] FSLIC reserves amounted to $6.5 billion or 1.0 percent of total thrift-institution assets in 1980, but had declined to $6.0 billion or 0.6 percent of total thrift-institution assets by the end of 1985.[5] In comparison, the estimated cost of disposing of the assets of all insolvent institutions was $14.7 billion in 1985.[6]

The turmoil in the thrift industry--an industry with more than $1 trillion in assets at the end of 1985--has contributed to a number of significant congressional and regulatory actions. The Congress passed two major pieces of legislation, the Depository Institutions Deregulation and Monetary Control Act in 1980 and the Garn-St Germain Depository Institutions Act in 1982. These Acts phased out interest-rate ceilings on deposits and gave federally insured thrift institutions additional asset-diversification powers. By 1984, moreover, more than one-third of the states had granted

state-chartered, federally insured institutions investment powers that exceeded the powers granted to federally chartered institutions. The Federal Home Loan Bank Board (Bank Board), which is the operating head of the FSLIC and primary regulator of thrifts, was also modifying its regulations. The minimum net-worth requirement was reduced by two percentage points during this period. The components of net worth were also broadened to include items under regulatory accounting practices (RAP, as established by the Bank Board) not included under generally accepted accounting principles (GAAP, as established by the Financial Accounting Standards Board). These changes further reduced the effective net-worth requirement. Increased concern about the extent of risk-taking by thrifts, however, led to new regulations in 1985 aimed at curtailing "excessively" risky activities by requiring additional net worth for rapidly growing institutions and by placing limits on direct investments. Most recently, the Bank Board has proposed gradually raising overall net worth requirements and is moving back toward GAAP.[7]

These developments have generated a heightened interest in the appropriate amount and type of legislative and regulatory control over the activities of not just thrift institutions but federally insured commercial banks as well (see Benston, Eisenbeis, Horvitz, Kane, and Kaufman (1986)). This interest appears to arise from concern that adverse financial developments like those recently encountered may erode public confidence enough to set off "bank runs" or, if not, may entail failures costly enough to swamp the federal insurance funds and thus impose costs upon taxpayers. An important factor relating to this broader concern is net worth, since it determines the financial condition of an institution. Although net worth equals assets minus liabilities, there are a number of ways in which these items can be measured. RAP and GAAP net worth are both based on book values

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of assets and liabilities and thus may significantly differ from the market-value of an institution. A critical issue, therefore, is how net worth should be measured and what is the relationship between market-value and a book-value measure of net worth. A related issue is the problem of moral hazard created by fixed-rate deposit insurance premiums, which, as Benston (1984), Flannery (1982), Kareken (1981, 1983a, b) and Kane (1985) explain, induces thrifts to hold riskier portfolios than would otherwise be the case.[8] The regulatory response to this particular problem has been a move toward variable-rate insurance premia or variable net-worth requirements, with the degree of variability reflecting the riskiness of an institution's activities. Risk-sensitive premia or net-worth requirements depend on a measure of net worth, however, which means that their development is intricately intertwined with the issue of net-worth measurement.

The purpose of this paper is to provide information about these and other issues through an examination of the determinants of the costs incurred by the FSLIC due to the recent thrift-institution failures.[9] Although there have been numerous studies that attempt to predict commercial-bank failures and a few that attempt to predict thrift-institution failures, only a meager amount of recent work has evaluated the cost to the federal insurance funds when institutions fail.[10] The importance of evaluating failure cost is that, as Merton (1977) and Horvitz (1983b) have pointed out, the risk to the insurer entails both the risk of insolvency and the magnitude of losses when insolvency occurs.[11] To our knowledge, only three studies of losses exist. Avery, Hanweck, and Kwast (AHK, 1985) examined failure costs for commercial banks, while Barth, Brumbaugh, Sauerhaft, and Wang (1985, 1985a) and Benston (1985) examined failure costs for thrifts.

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This paper differs from these recent studies in a number of important ways. We develop a model which describes the relationship between market-value net-worth and book-value net-worth. This is important because the FSLIC's costs to resolve failures reflect the negative market-value net worth of failed institutions, and we are actually investigating the relationship of market-value to book-value measures of net worth. As already noted, this is important for designing risk-adjusted premia or risk-adjusted net-worth requirements.[12] In our empirical analysis, we focus on the determinants of the costs of failure so as to assess the riskiness to the FSLIC of various activities that have recently come under increased regulatory control as well as to examine the importance of timeliness in closing insolvent institutions. At the same time, we examine the relationship between alternative book-value measures of net worth and the costs of failure.

I. Description of Thrift Failures and Resolution Costs

Unlike most industries, in the commercial bank and thrift industries the decision about when an institution has failed is a regulatory one. As a result, not all insolvent thrift institutions are closed. When thrift institutions do fail, however, the FSLIC resolves the failures by liquidation, by merger, or by providing financial assistance that allows an institution to continue operating.[13] In 1985, a new tool to deal with troubled institutions was introduced, called the Management Consignment Program (MCP). This program involves hiring outside management to manage the troubled institution in the hope that a merger--rather than a more costly liquidation--can ultimately be effected.

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Table 1 presents information for the 1980-1985 period on the number of thrift failures, classified by type and according to whether the closure resulted in costs for the FSLIC. For purposes of comparison, the number of voluntary mergers during this period is also presented. As can be seen, the number of liquidations is relatively small. Only 27 of the 581 institutions that failed from 1980 through 1985 were liquidated. Since 1934, only 40 of the 378 failures requiring FSLIC assistance have been resolved through liquidation. In contrast, since 1934 there have been 338 mergers, MCP's, and other actions requiring financial assistance by the FSLIC. Including the 25 MCP cases, 221 of these cases occurred during the 1980-1985 period. Table 1 also indicates that there have been 333 supervisory mergers during this recent six-year period. The unique aspect of these particular failures is that they impose no costs upon the FSLIC.[14] Given the turbulence in the thrift industry, it is not surprising that as Table 1 also shows there was a large number of voluntary mergers--those arranged through private agreements with no potential FSLIC costs--since 1980.

It is worthwhile to describe briefly how a thrift becomes a supervisory merger rather than a FSLIC-assistance case. A candidate for a supervisory merger is an institution that is considered by the Bank Board to have less than 24 months until it will no longer have positive RAP net worth. Although the Bank Board cannot force all supervisory candidates to merge, there are a number of incentives for those institutions selected as candidates to engage in a supervisory merger. First, current management may retain their positions. Second, the institution is not required to publish notice of the merger as would be required in the case of a voluntary merger. This eliminates the need for a public comment period on the merger, public hearings,

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Table 1

ATTRITION AMONG FSLIC-INSURED THRIFT INSTITUTIONS: 1980-1985

	Number of Failed Institutions				Nonfailed Attrition of Institutions	
	FSLIC Assistance Involved			No FSLIC Assistance Involved		
Year	Liquidations	Mergers and Other Types of Assistance Cases	Management Consignment Cases	Supervisory Mergers	Voluntary Mergers	Total
1980	0	11	0	24	82	117
1981	1	27	0	53	206	287
1982	1	69	0	182	262	514
1983	6	46	0	49	107	208
1984	9	19	0	14	33	75
1985	10	24	25	11	47	117
Total	27	196	25	333	737	1,318

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and in general avoids delay that would otherwise occur in the merger process. Third, antitrust constraints are often waived. All these provisions are made because a supervisory merger involves an institution that is considered to be a failing firm. Of course, some troubled institutions may resist a supervisory merger. In such cases, the Bank Board can remove the current management and appoint a conservator, who will then favor a supervisory merger, if any one or more of the following conditions exist: (1) the institution has regulatory net worth less than zero; (2) the institution is in an unsafe and unsound condition; (3) substantial dissipation of assets is occurring; or (4) a cease and desist order has been violated.

If a merger partner cannot be found to acquire a troubled thrift at no cost, it becomes a FSLIC-assistance case. The FSLIC then proceeds to estimate the cost of liquidating the institution, and bids are accepted from potential acquirers to determine whether a less costly merger can be arranged. The Garn-St Germain Act requires that bidders from the same state as the institution being acquired be given preference over out-of-state bidders, and that bidders that are of the same type of financial intermediary as the failed institution be given preference over different types of intermediaries. By law, the FSLIC must liquidate an institution if liquidation is less expensive than a merger.

Table 2 presents the costs incurred by the FSLIC for failed thrift institutions during the 1980-1985 period.[15] This table, therefore, presents the costs corresponding to the failures involving FSLIC assistance reported in Table 1. The first column in Table 2 presents the cost for the failed thrifts if they had all been liquidated. As can be seen, this cost rose dramatically in the first few years but then dropped significantly, leveling off at $1.5 billion. The second column presents the actual resolution cost

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Table 2

THRIFT-INSTITUTION FAILURE COSTS: 1980-1985

Year	Cost if Liquidated[a] (Thousands)	Actual Cost of Resolution[a] (Thousands)	Ratio of Actual Resolution Cost to Liquidation Cost	Actual Resolution Cost as a Percent of Total Assets of Failures Involving FSLIC Assistance
1980	$ 277,465	$ 166,644	0.60	11.4
1981	3,721,272	1,018,243	0.27	7.3
1982	6,983,101	1,212,907	0.17	4.2
1983	3,521,857	1,020,595	0.29	5.2
1984	1,526,685	833,054	0.55	14.4
1985	1,508,479	948,698	0.63	14.2

[a] The liquidation cost and actual resolution cost are present-value estimates that are calculated by the FSLIC in order to determine how to resolve each case. In the case of mergers, the costs represent an agreed-upon figure between the FSLIC and the institution acquiring the failed thrift, and thus to this degree represent a market-determined figure. In cases where liquidation is less expensive than an alternative solution, the liquidation cost appears in the second column as well as the first column. With exception of the Management Consignment Program cases that are excluded due to unavailability of data, these cost figures correspond to the failures involving FSLIC assistance reported in Table 1.

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for these same failures. That the figures in this column are less than those in the first column indicates that not all failures were resolved by liquidation. Indeed, the difference between the costs in the two columns reflects the savings to the FSLIC through mergers. Notice that from 1981 onward the annual closure cost levels off at about $1 billion. This leveling off reflects the fact that the FSLIC could not continue closing thrifts at a rate where costs would exceed its insurance premium and other income. Instead, the number of insolvent but still operating thrifts grew and the MCP was introduced. Column three shows that by being able to resolve most failures by merger, the costs incurred by the FSLIC were only 17 to 63 percent of those that would have been incurred if all failures were resolved by liquidation. The last column in Table 2 presents information on the costs of failed thrifts as a percent of the total assets of those thrifts. The percentages ranged from a low of four percent in 1982 to a high of fourteen percent in 1984 and 1985.[16] This variability in total FSLIC costs per dollar of assets for the 581 thrift failures in this period reflects several factors that are discussed in the next section.

II. Failure Costs, Market Values, and Accounting Measures of Net Worth

The costs to the FSLIC when thrifts fail are directly related to the degree of "insolvency" of a thrift. When assets are worth less than liabilities, an institution is insolvent. The greater the degree of insolvency, the greater the costs to the FSLIC. To contain its costs the FSLIC must, therefore, have a way to assess and thus to periodically monitor the net worth of an institution.[17] Three accounting measures of net worth are available to the Bank Board and to the FSLIC on a regular basis: (1) net worth based upon RAP, (2) net worth based upon GAAP, and (3) tangible net worth.

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Tangible net worth is the most narrow measure. GAAP net worth is somewhat broader because it allows goodwill and other intangibles and Income Capital Certificates (ICCs) to be included as assets on the balance sheet. Income-Capital Certificates are issued by undercapitalized thrifts to the FSLIC in return for promissory notes. The certificates can be counted as capital by the institution. Thus if a thrift fails and is liquidated, thereby not paying off the promissory notes from the FSLIC, the insurance fund takes a loss for the full value of the certificates. Goodwill is recorded when one institution acquires another. It is the difference between the liquidation value of the acquired institution if its assets and liabilities were to be sold separately on the open market and the actual higher price paid for that institution by the acquirer. Goodwill may therefore be viewed as representing the "charter value" (or the value of the firm as a going concern) of the acquired institution. RAP net worth, in addition to goodwill and ICCs, allows for appraised equity capital and net-worth certificates (authorized by the Garn-St Germain Act) to count as net worth, and for losses on asset sales to be deferred. Net Worth Certificates are similar to ICCs. Appraised equity capital represents one-time accounting adjustments that have been made to the value of fixed assets to allow the books to reflect the assets' increased appraised market value. It is a biased method of mark-to-market because while mark-ups occur, mark-downs do not. Both the appraised equity capital and loss deferral provisions are being phased out so that currently no new appraised equity capital or deferred losses may be booked.[18]

All three of these measures of net worth are based upon the value of the assets and liabilities when these balance-sheet items were first entered onto the books of the thrift. As Table 3 shows, these book-value measures provide

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Table 3

ACCOUNTING MEASURES OF NET WORTH AND RESOLUTION COSTS
FOR FAILED THRIFTS*
DECEMBER 1981-OCTOBER 1985

	Mean	Standard Deviation	Maximum	Minimum
Dollar Amount (in thousands)				
RAP Net Worth	$ -640	$11,170	$ 44,300	$ -104,500
GAAP Net Worth	-3,170	18,220	38,200	-192,200
Tangible Net Worth	-7,000	61,300	33,400	-1,049,500
Failure Costs	8,940	41,030	559,670	0
Ratios to Total Assets (in percentages)				
RAP Net Worth	-0.1	6.5	27.2	-77.7
GAAP Net Worth	-0.7	6.9	20.7	-77.7
Tangible Net Worth	-1.0	7.0	8.1	-77.7
Failure Costs	3.9	10.0	88.0	0

* This table contains information on 324 federally insured failures that were resolved during the December 1981-October 1985 period. Since 1980 there have been a total of 581 such failures, so that this table provides information on 56 percent of all recent FSLIC-insured failures. Unavailability of data precluded information on all failures.

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different reflections of the financial condition of thrift institutions. Since all the institutions represented in the table failed, it is clear that the book-value measures of net worth systematically understated the cost to the FSLIC of resolving the failures. This explains why the appropriate measure of net worth is a market-value measure. For, as will now be discussed more fully, it is only through the availability and reliance upon such a measure that the FSLIC can ultimately contain its risk exposure.*

The market-value measure of net worth equals the present value of the expected future net cash flows. More formally,

$$MVNW_t = \sum_{i=0}^{\infty} B^i E(P_{t+i}), \tag{1}$$

where $MVNW_t$ is market-value net worth at time t, B is a discount factor, E is the mathematical expectations operator, and P is the cash flow.[19] Letting $MVNW_t^*$ be the perfect forecast present value, we can write

$$MVNW_t^* = MVNW_t + U_t, \tag{2}$$

where $U_t = MVNW_t^* - E(MVNW_t^*)$ is the forecast error. This means that only without forecast errors will the observed measure of market-value net worth be exactly equal to true market value. Otherwise, these two values will differ. Assuming rational expectations, however, this difference will be "white noise," and the observed measure of market value will be an unbiased measure of true market value.[20]

The relationship between a book-value measure of net worth and a market value measure can be obtained as follows. Based upon equations (1) and (2), one can write

$$MVNW_t = (1/B)\, MVNW_{t-1} - (1/B)\, P_{t-1} - U_t + (1/B)\, U_{t-1}. \tag{3}$$

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* Editor's Note: Market-value calculations are not appropriate for all decisions made by the Federal Home Loan Bank Board.

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Book-value net worth, on the other hand, is equal to

$$BVNW_t = (1/B)\, BVNW_{t-1} - (1/B)\, P_{t-1}, \qquad (4)$$

so long as the assets and liabilities remain on the books. Assuming that these two measures are equal at the time the assets and liabilities are entered onto the books (time T) and that expectations remain unchanged, one finds that

$$MVNW_t = BVNW_t - U_t, \qquad (5)$$

where the term $1/B^{t-T}\, U_T$ is omitted because it approaches zero the farther back into time one goes.[21]

This equation states that book and market-value measures of net worth differ by a "white noise" error term--reflecting unanticipated and unrealized capital gains and losses--so long as the two measures were equal when the assets and liabilities were entered onto the books and expectations are formed rationally and remained unchanged through time. But it is known that the two measures of net worth may not even be equal when the assets and liabilities were entered onto the books. The reason is that, as Maisel (1979) explains, the value of such intangibles as information, customer relations, and good will may be considerable yet not included in book-value net worth. In other words, equation (5) captures, at best, the liquidation value of a thrift but not its value as a going concern. Even here it is still deficient, for reserves for loan losses may inaccurately reflect actual expected losses and other reserves, such as those for contingencies and deferred taxes, may actually increase market-value net worth.

To account for these and other factors that cause market and book values to differ, equation (5) may be modified as follows:

$$MVNW_t = a + b\, BVNW_t - U_t, \qquad (6)$$

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where nonzero values of a and b indicate that book-value net worth is not an unbiased measure of true market-value net worth. This further means that economic and accounting cash flows will not simply differ ex post due to unanticipated and unrealized capital gains and losses or forecast errors, but will also differ ex ante because accounting cash flows will not now be a best linear predictor--in a mean-square error sense--of future true cash flows. Depending upon the specific accounting provisions made, clearly there may be more than one accounting or book-value measure of net worth. Only one can be unbiased, however, in the sense that it produces values of zero for a and unity for b. Due to "charter value," one would expect a to be positive.

In general, the value of b could be greater or less than unity. For troubled institutions, however, the value of b is likely to be less than unity. The reason is that if an institution that is approaching insolvency, and thus subject to close regulatory scrutiny, has assets that are "above water," it has an incentive to sell those assets in order to book the cash gain and reduce its exposure to supervisory pressures. On the other hand, the institution has an incentive to retain those assets that are "under water" to avoid booking cash losses. Thus, all thrift institutions failing their regulatory net worth requirement are likely to have values of b less than unity.

If expectations change at some future time, there can be an abrupt and systematic divergence between market-value and book-value measures of net worth. It is this type of change that is most crucial for relying on market-value rather than book-value measures of net worth. In late 1979, for example, many argue that expectations regarding future short-term interest rates shifted upwards, thereby causing future expected profits of thrifts to decline since their liabilities were paying flexible short-term rates and

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their assets were earning fixed long-term rates. This caused market-value net worth for thrift institutions to decline abruptly and systematically from book-value net worth. This was considered to be a permanent decline and not just a temporary decline due to an error in forecasting profits. More recently, some believe the reverse has occurred, with expected future profits having shifted upwards. The difficulty, of course, is in identifying random forecast errors and expectational shifts that result in movements in market-value net worth when deciding on an appropriate policy for determining when an institution is insolvent and thus a candidate for closure.

There are a number of summary comments to be made about equations (1) and (2). First, it is clear that it is future expected net cash flows and not past actual cash flows that determine the current market-value net worth. This means that past cash flows may be a misleading indicator of current market-value net worth. It also means that an institution that is insolvent in market-value terms can earn accounting cash flows for a time and, thus, pay dividends if it is a stock-type thrift. (For a more comprehensive discussion of the long-term viability of the thrift industry, see Hess (1986)). Second, if there is no information about $MVNW_t^*$, then $MVNW_t$ will be a constant and $MVNW_t^*$ will vary. Information is generally available about $MVNW_t^*$, however, so that $MVNW_t$ will indeed vary. This means that book-value net worth will generally be a biased measure of market-value net worth. Third, whatever affects expected future cash flows affects current market-value net worth. For a thrift institution, this means expectations about those factors that determine its cash flows, such as interest rates on assets and liabilities, which, in turn, are affected by the provision of federal

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deposit insurance and the premium structure, asset and liability powers, net-worth requirements, tax factors, and competition from within and without the thrift industry.[22]

Finally, although market-value net worth is extremely important, a measure is frequently not readily available. For stock institutions, one can argue that the price of the stock multiplied by the number of shares outstanding is such a measure. This would be the case, however, for only widely and actively traded stocks so that one could be reasonably sure that the current price reflected expectations conditional upon all currently available information. For both commercial banks and thrift institutions, this condition is not satisfied for the overwhelming majority of institutions. As an alternative, one can attempt to adjust book-value measures of assets and liabilities to reflect current values, something that is quite difficult since many of these balance-sheet items are not actively traded in secondary markets.[23]

For purposes of this paper, a measure of market-value net worth is available. It is the cost incurred by the FSLIC when a thrift fails. As discussed above, when a thrift fails it is either liquidated or merged. Whether an institution is liquidated depends on the bids the FSLIC receives from financially healthy institutions. If a bid for an institution results in lower costs to the FSLIC than if the institution is liquidated, the bid is accepted and a merger occurs. Otherwise, a liquidation occurs. In either case, however, the FSLIC incurs costs to bring the market value of assets up to the market value of liabilities.[24] In the case of a liquidation, the market value is based upon the unbundling of the assets and liabilities, whereas in the case of a merger the market value is based upon the assets and liabilities remaining intact. The market-value net worth for a failed thrift

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if liquidated therefore serves as an upper-bound cost to the FSLIC. To the extent that a failed thrift generates additional value by remaining intact, for example, due to entry and to geographical restrictions, a merger becomes the likely resolution to dealing with a troubled thrift and the costs to the FSLIC are accordingly lower.[25] Since in the case of thrift failures one is talking about zero or negative values for net worth, the failure costs reflect negative market-value net worth. Table 3 shows that this measure differs systematically from accounting or book-value measures of net worth.

We are now in a position to examine the determinants of failure costs or negative market values. Special attention will be paid to the relationship between alternative book-value measures of net worth and these costs. Attention will also be paid to the relationship between variables that have recently come under greater regulatory scrutiny--due to the belief that they contribute to failure costs--and failure costs. Since the Bank Board and the FSLIC are interested in the likelihood that a thrift institution's market-value net worth will become negative and, if so, what resulting costs will be incurred, our results provide new information about these costs as well as which book-value measure of net worth is most closely related to these costs. The next section now examines these issues.

III. An Empirical Analysis of Failure Costs to the FSLIC

To understand the exposure risk to the FSLIC we examine empirically 324 thrifts that failed during the period December 1981 through October 1985, for which summary statistics are presented in Table 4.[26] In addition to all failures, the data are broken down by the three different methods used to resolve troubled thrifts. As may be seen, the average size of the failed thrifts in our sample is $169.2 million and the average cost per failure to

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Table 4

SUMMARY STATISTICS FOR 324 FEDERALLY INSURED
THRIFT INSTITUTION FAILURES
DECEMBER 1981-OCTOBER 1985

Type of Failure	Number of Failures	Mean	Standard Deviation	Maximum	Minimum
All Failures	324				
Cost		$ 8.9	$ 41.0	$ 559.7	$ 0
Total Assets		169.2	360.0	3997.0	2.3
FSLIC-Assisted Liquidations	17				
Cost		59.9	92.2	330.4	1.0
Total Assets		177.1	253.6	841.5	4.9
FSLIC-Assisted Mergers	89				
Cost		21.1	61.5	559.7	0.3
Total Assets		305.4	572.1	3997.0	2.3
Supervisory Mergers	218				
Cost		0	0	0	0
Total Assets		112.9	211.2	1976.6	5.2

Note: All dollar figures are in millions.

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the FSLIC is $8.9 million.[27] Although the average size of FSLIC-assisted liquidations is only about 60 percent of the average size of FSLIC-assisted mergers, the cost is 300 percent greater for the FSLIC. Finally, the vast majority of failures in our sample, and in general, are supervisory mergers that impose no costs on the FSLIC. In the two previous studies of thrift failure costs, the samples were smaller, and all supervisory mergers were excluded, thereby resulting in a biased sample of thrift failures.[28]

To explain the cost of failure for institution i, we posit the following model

$$\text{Cost}_i = a_0 + a_1 \text{ Net Worth}_i + a_2 \text{ Cost of Funds}_i + a_3 \text{ Credit Risk}_i \quad (7)$$

$$+ a_4 \text{ Liquidity}_i + a_5 \text{ Regulatory Variable}_i + a_6 \text{ Other}_i + e_i,$$

where the right-hand side variables reflect categories of variables that are more fully defined in Table 5. Equation (7) is related to equation (6) in that all the variables included as regressors collectively capture book-value net worth and changed expectations regarding the value of the assets and liabilities since they were entered onto the thrift institution's books. The intercept term is related to the intercept term in equation (6) that represents "charter value." The disturbance term is included to capture the forecast errors.[29] Of course, equation (7) also reflects, as Kaufman (1985, p. 10) explains, the fact that the FSLIC may not engage in sufficiently "appropriate monitoring to obtain timely and current observations" on market-value net worth. In a world of complete and perfect information as well as the technical and legal ability to take actions to deal with troubled institutions instantaneously, the FSLIC could eliminate its failure costs entirely.

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Table 5

VARIABLE DEFINITIONS, MEANS, AND STANDARD DEVIATIONS

Variable[a]	Definition	Mean[b]	Standard Deviation
COST	Cost to the FSLIC to resolve or to close a troubled institution.	8.94	41.03
Net Worth			
RNW	Net worth, as calculated by regulatory accounting practices (RAP).	-0.64	11.17
GNW	Net worth, as calculated by generally accepted accounting principles (GAAP). GNW is equal to RNW less qualifying mutual capital certificates, qualifying subordinated debentures, appraised equity capital, net-worth certificates, accrued net-worth certificates, and deferred net losses (gains) on loans and other assets sold.	-3.17	18.22
TNW	Tangible net worth. TNW is equal to GNW less goodwill and other intangible assets.	-7.00	61.30
Cost of Funds			
CA	Dollar cost of advances.	12.98	3.39
Credit Risk			
F	Conventional mortgage foreclosures and deeds in lieu of foreclosure.	0.50	1.86
D	Total slow loans and scheduled items, delinquent loans.	4.85	15.17
Liquidity			
LA	Liquid assets (total cash plus securities including accrued interest less valuation allowance).	11.90	33.22
Of Regulatory Concern			
ADL	Loans for acquisition and development of land and unimproved land.	2.61	11.66
BD	Broker-originated deposits.	2.83	16.60
DI	Direct investment (equity investments in a service corporation, real estate investment, real estate investment: other).	4.05	21.37
JCD	Jumbo certificates of deposit.	12.28	33.22
Other			
INS	The number of months between when a failed thrift became GAAP insolvent and when it was closed. If the institution was GAAP solvent at the time of closure, INS equals zero.	4.69	8.82
LQMR	A dummy variable taking the value of 1 if the case was resolved through a liquidation and a 0 if the case was resolved through a merger.	0.06	0.24
MLSK	A dummy variable taking the value of 0 if the institution is of mutual form and 1 if the institution is of stock form.	0.20	0.40
STFED	A dummy variable taking the value of 0 if the institution is a state-chartered thrift and a 1 if the institution is a federally chartered thrift.	0.57	0.50
TA	Total assets for each institution.	169.15	360.00

[a] Through December 1983, all FSLIC-insured institutions reported their financial conditions to the Bank Board in the Semiannual Financial Report. Beginning in March 1984, the Quarterly Financial Report has been used.

[b] Units are in millions of dollars for all balance-sheet variables.

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Short of this, there are undoubtedly future actions the FSLIC could take to reduce these costs. This means that the parameters in equation (7) are subject to variation as the monitoring rule of the FSLIC changes--or any regulatory or policy rule changes as Robert Lucas (1976) has forcefully pointed out. Based upon Kaufman's observation, one therefore has to view equation (7) as holding only so long as the particular monitoring regime in place during the estimation period remains in effect. The main qualification to this interpretation is that it presumes that the FSLIC can indeed take appropriate action based upon improved monitoring if an institution is market-value insolvent even though its book-value net worth is not very low. In this regard, Horvitz and Pettit (1981 p. 48) have stated that "in fact, the current situation in which liquidation values are well below book values has put the insurance agency in the position of being concerned with a firm's solvency when, according to FDIC-FSLIC book-value rules, insolvency cannot be declared." They add that "This may prevent the insurance agency from taking early corrective action to protect its claim even when it is in the best interests of the agency to do so."

Finally, before discussing the variables further, it is important to indicate that, unlike the two previous studies of thrift failure costs, equation (7) was estimated using a Tobit model and correcting for heteroskedasticity. The reason for using a Tobit model is that for a large percentage of our sample, the failure costs are all zero, even though in principle, these costs can be negative. Since these costs are missing due to censoring, a censored normal regression model is appropriate.[30] Regarding heteroskedasticity, when equation (7) was estimated by ordinary least squares, the residuals indicated the presence of heteroskedasticity. We

therefore weighted all variables by the square-root of total assets, which was the indicated weight based upon regressions of the residuals-squared from the unweighted regressions on different transformations of total assets. In contrast to the usual practice in empirical studies of this type, we do not weight some variables and not others.[31]

The empirical results from estimating equation (7) are reported in Table 6, where there are three alternative specifications corresponding to the three alternative book-value measures of net worth.[32] If all three accounting measures were unbiased measures of market value, their coefficients would be identical and equal to minus one, and the other coefficients would equal zero. This is not the case, however. Instead, RAP net worth has no significant effect on cost, while both GAAP and tangible net worth significantly reduce failure costs. The coefficients of GNW and TNW indicate that each additional dollar of GNW reduces cost by 32 cents while an additional dollar of TNW reduces cost by 47 cents. Since RNW bears no relationship to failure costs, regulators can obtain more information about risk exposure to the FSLIC by paying attention to GNW and TNW. In April of 1986, the Bank Board proposed to eliminate some of the differences that developed in the early 1980s between RAP and GAAP and to require that all financial statements be prepared using GAAP.[33] Our regression results suggest that the change should provide more reliable information about the relationship between book-value and market-value net worth. In particular, they suggest that by relying on RAP, the FSLIC will systematically be tardy in responding to troubled institutions and, thereby, increase its costs.

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TABLE 6

TOBIT ANALYSIS OF FSLIC LOSSES RESULTING FROM 324 THRIFT FAILURES, DECEMBER 1981-OCTOBER 1985

Dependent Variable: Cost to the FSLIC for Thrift Failures

Independent Variable		Alternative Specifications (1)	(2)	(3)
Net Worth				
RNW	(RAP net worth)	-0.12 (-0.64)		
GNW	(GAAP net worth)		-0.32 (-2.18)**	
TNW	(Tangible net worth)			-0.47 (-6.47)**
Cost of Funds				
CA	(Cost of FHLBank advances)	2.50 (2.31)**	2.80 (2.56)**	3.19 (3.33)**
Credit Risk				
F	(Foreclosures)	1.06 (0.84)	1.13 (0.91)	0.82 (0.75)
D	(Delinquent loans)	0.35 (1.96)**	0.34 (1.95)*	0.29 (1.91)*
Liquidity				
LA	(Liquid assets)	0.05 (0.35)	0.01 (0.08)	0.08 (0.61)
Of Regulatory Concern				
ADL	(Acquisition and development land loans)	0.60 (2.51)**	0.61 (2.58)**	0.69 (3.32)**
BD	(Brokered deposits)	0.07 (0.48)	0.06 (0.40)	0.04 (0.34)
DI	(Direct investments)	0.80 (5.75)**	0.72 (5.68)**	0.65 (6.58)**
JCD	(Jumbo CD's)	0.06 (0.60)	0.08 (0.84)	0.12 (1.40)
Other				
INS	(Months between insolvency and closure)	3.71 (4.81)**	3.27 (4.23)**	2.54 (3.92)**
LQMR	(Liquidation = 1/ merger = 0)	23.10 (1.13)	26.03 (1.28)	24.40 (1.38)
MLSK	(Mutual form = 0/ stock form = 1)	26.09 (1.60)	23.09 (1.42)	17.53 (1.25)
STFED	(State-chartered = 0/ federally chartered=1)	-12.48 (-0.92)	-12.07 (-0.90)	-8.11 (-0.71)
TA	(Total assets)	-0.03 (-1.60)	-0.04 (-1.93)*	-0.06 (-3.49)**
Constant		-78.69 (-6.10)**	-73.94 (-5.74)**	-56.44 (-5.14)**
Summary Statistics				
Log Likelihood (a_i=0, for i=1...6)		-381.70	-379.47 (-480.40)	-362.27
Pseudo-R^2		0.48	0.49	0.55

Note: Units are in hundreds of thousands of dollars. t-statistics are in parentheses. A double asterisk indicates statistical significance at a 5 percent level and a single asterisk indicates significance at a 10 percent level. For a description of the pseudo-R^2, see Maddala (1983, p.40).

A particularly interesting variable included in our model but in no previous empirical financial failure or cost model is INS, representing the length of time (measured in number of months) between the time when a thrift became GAAP insolvent and when it was closed. This variable links costs to the speed with which regulators move to close insolvent institutions. The importance of this particular variable is that, as the Chairman of the Bank Board (Gray 1986, p.1) has recently pointed out, any "delay [in the] resolution of failing institutions [results] ultimately in higher costs to the FSLIC." Our results confirm that delay in closing insolvent institutions does indeed increase the costs to the FSLIC. This finding is consistent with the view that once an institution becomes insolvent it "gambles for resurrection" (see Barth, Brumbaugh, Sauerhaft and Wang (1985b), Barth, Bisenius, Brumbaugh and Sauerhaft (1986), and Benston and Kaufman (1985)) and supports Kane's (1983) emphasis on the need to grant regulators additional authority so that they can take more timely action in dealing with troubled institutions. Since the cost variable is measured in units of $100,000, the estimated coefficient of INS indicates that delaying closure an additional month increases the ultimate cost by between $254,000 and $371,000 per institution. At year-end 1985, 229 institutions were GAAP insolvent and were earning negative net income. Assuming these institutions are eventually closed, our regression results indicate that the incremental monthly cost to the FSLIC of permitting them to remain open is between $58 million and $85 million. The annual cost due to delaying closure is between $700 million and $1 billion.

Two controversial regulatory variables whose coefficients are both positive and significant are ADL and DI. Considering these variables as leading to a significant increase in the FSLIC's risk exposure, the Bank

Board adopted a regulation in January of 1985 constraining the amount of direct investment that thrifts could acquire.[34] In contrast to the results of Benston (1985), our results suggest that this type of investment does indeed increase the costs to the FSLIC once an institution fails. The Bank Board has recently proposed to require that additional net worth be held against all direct investments and land loans.

The other variables that are significant are CA, D, and TA. The cost of funds variable CA, the interest paid for advances from the Federal Home Loan Banks, is positive and significant in each specification. The finding that the greater the cost of funds the greater FSLIC's costs reflects two factors. First, the FSLIC will sometimes guarantee the advances that an ailing thrift borrows from its FHLBank, and thus the FSLIC assumes a contingent liability on which it may have to pay if the thrift fails. Second, the amount of advances may reflect the overall magnitude of an institution's problems not completely captured by other variables. This is suggested by the fact that for the 71 thrifts that were RAP insolvent in 1984, their advances as a percent of their total assets amounted to 16.3 percent, whereas for all thrifts the corresponding figure was only 7.3 percent.

The coefficient on delinquent loans, D, was significant and positive in all three regressions. Total assets, TA, has a negative coefficient in all three regressions, while being significant in both the GNW and TNW specifications. The negative effect that TA has on failure costs is consistent with FSLIC's policy of normally considering interstate bids only for large failing institutions. This, of course, increases the "charter value" of large relative to small failing thrifts. The intercept, which from equations (6) and (7) represents "charter value," is negative and significant in all regressions, indicating its role in raising the market value of thrift

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institutions. "Charter value" varies from $5.6 million to $7.9 million, on average, per institution or between 3.3 percent and 4.7 percent of assets for the average size institution in the sample.[35] These figures are consistent with Kane's (1982) point that underpriced deposit insurance contributes significantly to the market values of thrifts.[36]

The remaining insignificant variables merit a brief summary. Liquidity risk is frequently examined in studies of commercial-bank and thrift-institution failures. However, since the book-value and market-value of liquid assets (LA) are essentially the same, this variable provides no new information about market-value net worth. This is also true of the liabilities brokered deposits (BD) and jumbo CDs (JCD). The dummy variables for type of failure resolution, type of thrift organizational form, and type of charter under which the thrift operates are not significantly related to failure costs. The other explanatory variables, in other words, have sufficient explanatory power that these ad hoc variables add nothing.

IV. Summary and Conclusions

The first half of the decade of the 1980s witnessed a historic number of business and financial-firm failures. These failures were associated with the collapse of private deposit-insurance systems in Ohio and Maryland and a weakening of public confidence in the safety of their deposits at federally insured depository institutions, especially as the insurance funds were being drawn down significantly for the first time since their establishment in the 1930s. Thrift institutions were particularly hard hit, with an average annual failure rate three times the rate for business firms and twelve times the rate for commercial banks during the period 1980-1984.[37] The reserves of

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the FSLIC were also considered insufficient to close all insolvent institutions during this period, resulting in a growing number of insolvent but still operating thrifts.

Not surprising, these developments occurred during a changing legislative and regulatory environment. The initial environment was one of deregulation as interest-rate ceilings were phased out and thrifts were given greater asset diversification powers. As the problems of thrifts mounted, regulations were eased through a lowering of the net worth requirements and a broadening of the definition of what constituted net worth. Most recently, however, this environment is evolving in the direction of more stringent regulations in the form of prior approval rules for certain portfolio strategies and higher net-worth requirements.

The purpose of this paper has been to examine the recent failures in the thrift industry and more especially the costs imposed upon the FSLIC. The reason for focusing on these costs is that the rationale for many of the recent legislative and regulatory actions is centered on the risk exposure to the FSLIC. This means that thrift failures per se are not the problem, but rather the costs incurred by the FSLIC due to the failures. If the market-value net worth of an institution were readily and instantaneously available to the FSLIC, then the failure costs could be reduced to zero through appropriate monitoring. But this is not generally the case. Only in the case of failed thrifts is the market value of net worth known, and this value is the costs incurred by the FSLIC.

We have, therefore, examined the relationship between these costs and various balance-sheet items that are readily available for all thrifts, not just those that fail. We have paid particular attention to the relationship between alternative accounting or book-value measures of net worth and

failure costs. It was found that the measure used by the regulatory authorities (RAP net worth) to trigger insolvency proceedings was unrelated to the costs of failure incurred by the FSLIC. Two other readily available measures (GAAP and tangible net worth), however, were significantly related to failure costs. Both measures therefore provide information about the risk exposure to the FSLIC, implying that this exposure is reduced when these measures of net worth are increased, but by less than dollar-for-dollar. This means that although market-value accounting would be the optimal solution to dealing with the FSLIC's risk exposure problem, its difficulty in being implemented still leaves the regulator with informative book-value measures of net worth.

Besides examining these measures of net worth, the effect of delaying the closure of insolvent thrifts on the FSLIC's costs was examined. The results indicate that delay is indeed costly, with costs increasing between $254,000 and $371,000 per institution for each month that an institution is permitted to remain operating after it has become insolvent. With sufficient reserves this is a cost that the FSLIC can avoid.

Other important variables found to be significantly related to failure costs were acquisition and development loans (ADL) and direct investments (DI). In January of 1985 the Bank Board adopted a controversial regulation aimed at curtailing these types of assets on the grounds that they increased the risk exposure to the FSLIC as well as moved thrifts away from their more traditional role of provider of residential mortgage funds. In April 1986, the Bank Board proposed to require that additional minimum net worth be held by institutions engaging in direct investments and acquisition and development loans. Our results indicate that both types of assets do indeed significantly increase the costs to the FSLIC for resolving thrift failures. The results more generally indicate that there are alternative ways of reducing

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the risk exposure to the FSLIC. Increasing GAAP net worth alone negatively affects failure costs, and thus increased net worth may allow for less stringent regulation. More work needs to be done to determine the appropriate amount of regulation and sensitivity of deposit insurance premia and net-worth requirements to portfolio risk for depository institutions insured by the federal government.[38]

FOOTNOTES

1 The term "thrift institution" denotes savings and loan associations and savings banks, both federally and state-chartered, that are insured by the FSLIC. An institution is defined to be a failure if it is liquidated by the FSLIC, merged by the FSLIC with financial assistance, received financial assistance from the FSLIC to remain in operation, or merged as the result of supervisory action taken by the Federal Home Loan Bank Board.

2 For comparison, 309 commercial banks insured by the Federal Deposit Insurance Corporation (FDIC) with assets of $36 billion failed during the 1980-1985 period, representing 2 percent of all banks existing in 1980. The cost to resolve the failures was $3.4 billion for the 1980-1984 failures.

3 An institution is defined to be insolvent if its net worth based upon generally acceptable accounting principles (GAAP) is zero or negative. A more complete discussion of alternative measures of net worth, and thus insolvency, is presented below where it is made clear how book-value net worth can differ from market-value net worth and thus that insolvencies based on GAAP may not accurately reflect market value insolvencies.

4 The Chairman of the Bank Board (Gray 1986, p.2) has recently stated "the insurance fund must be recapitalized to provide the resources necessary to resolve problem cases in as timely a manner as possible."

5 The Chairman of the Bank Board (Gray 1986) stated that actually "the usable resources of the fund are significantly less than the FSLIC's book reserves." In addition to its reserves, the FSLIC has a $750 million line of credit from the Treasury, may assess extra premiums against insured thrifts, and may require deposits from insured thrifts to 1 percent of their saving deposits.

6 The estimated FSLIC cost was calculated by multiplying the assets of GAAP-insolvent institutions by the FSLIC's estimated cost per dollar of assets for resolving FSLIC cases in 1985. See Barth, Brumbaugh, Sauerhaft, and Wang (1985b). The Chairman of the Bank Board (Gray 1986) estimated the cost to resolve insolvent thrifts at $22.5 billion over the next five years.

7 The Bank Board tends to lower requirements during periods of financial strain and to raise them during more profitable periods. It may, however, be more appropriate to vary, if at all, the enforcement of the regulations rather than the regulations themselves. Alternatively, to the extent that requirements and enforcement are adjusted to reflect divergences between market and book value measures of net worth it might be better to simply switch to a market-value measure.

8 For formal models in which this is demonstrated, see Kareken and Wallace (1978) and Buser, Chen, and Kane (1981). Horvitz (1980), Bierwag and Kaufman (1983) and Kaufman (1985), on the other hand, point out that fixed-rate deposit insurance premiums induce insured institutions to undertake more risk only to the extent that the increased risk cannot be monitored by the regulator.

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FOOTNOTES (cont'd)

9 Cassidy (1980) provides an interesting discussion of the appropriate level of FSLIC's reserves as well as suggests the type of study conducted here.

10 Bank failure studies include Avery and Hanweck (1984), Bovenzi, Marino, and McFadden (1983), Martin (1977), Meyer and Pifer (1970), Pettway and Sinkey (1980), Santomero and Vinso (1977), Sinkey (1975), Sinkey (1978), and Sinkey and Walker (1975), while thrift failure studies include Altman (1977), Barth, Brumbaugh, Sauerhaft and Wang (1985a), Benston (1986), and Brewer and Garcia (1985).

11 The importance of examining failure costs was pointed out by Merton (1979, p. 260), who wrote that "...the problem of insolvency is not a sufficient measure of the risk of insolvency because it does not capture the magnitudes of the losses in the event that insolvency occurs."

12 The design of a risk-sensitive deposit-insurance premia or capital requirement may be based on both failure studies and failure cost studies. As suggested by BBSW (1985a) for thrift institutions and AHK (1985) for commercial banks, the premia or capital requirement would be based on the probability of failure and the expected cost to the insurer given failure. The probability of failure can be estimated as done by BBSW and AHK using a multinominal logit model and the failure cost can be estimated in the way described in this paper. The product of the probability of failure and the estimated cost in the event of failure form the risk-sensitive premia or capital requirement. An option-pricing approach can also be used to determine the appropriate risk-adjusted insurance premia (see, for example, Marcus and Shaked (1984) and McCulloch (1985)). AHK (1985, p. 222), who calculated insurance premiums reflecting risk, rejected this approach because "it requires stock price data which are available for only a small number of banks." In the case of thrifts, 67 percent of the 3245 thrifts in existence in December 1985 are mutual rather than stock associations. Furthermore, only 250 of the 1071 stock thrifts are actively traded. It should also be noted that Pyle (1983) points out that when using the option-pricing approach the insurance premium depends on two parameters that are subject to measurement error. As a result, he states that "Modest errors in measuring these parameters will overwhelm the desirable properties of risk-adjusted deposit insurance premia."

13 The FSLIC can increase the regulatory net worth of failing institutions by issuing promissory notes in return for income-capital or net-worth certificates. These promissory notes can be counted as net worth by the ailing institutions.

14 The FSLIC may actually provide assistance guarantees to a merger partner in the event unforeseen events occur. Data regarding such arrangements are unavailable.

15 For an extremely insightful and informative analysis of both FDIC's and FSLIC's failure costs from 1934 through 1969, see Scott and Mayer (1971).

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FOOTNOTES (cont'd)

16 For comparison, the corresponding percentages for failed commercial banks during this period ranged from a low of 9.4 percent in 1984 to a high of 16.1 percent in 1983.

17 Thrift institutions were required to file semiannual financial reports to the Bank Board through 1983, and quarterly reports thereafter.

18 No new appraisal equity capital may be booked after December 31, 1986. Losses on the sale of assets may currently be deferred only on assets owned prior to October 28, 1984. Current proposals to redefine regulatory capital would disallow any new deferred losses.

19 Actually, the market value of net worth is the present value of expected future cash profits adjusted for a risk factor, reflecting the fact that a thrift's portfolio is necessarily less diversified than the market portfolio consisting of all securities.

20 For an analysis of the way in which the term "rational expectations" may be interpreted as well as econometric issues pertaining to its implementation, see Swamy, Barth, and Tinsley (1982).

21 Equation (5) may alternatively be written as

$$MVNW_t = BVNW_t + \sum_{j=1}^{T} B^{-j} U'_{t-j},$$

where U'_t is the "white noise" forecast error for P_t. This expression may be derived as follows.

$$MVNW_t = \sum_{i=0}^{\infty} B^i E(P_{t+i}), \qquad (1)$$

where expected cash flows are related to actual cash flows by

$$P_t = E(P_t) + U'_t. \qquad (2)$$

Solving for $E(P_t)$ in equation (2), substituting it into equation (1), and taking first differences, one obtains

$$MVNW_t = 1/B\ MVNW_{t-1} - 1/B\ P_{t-1} + 1/B\ U'_{t-1}. \qquad (3)$$

It is also known that

$$BVNW_t = 1/B\ BVNW_{t-1} - 1/B\ P_{t-1}, \qquad (4)$$

so that equations (3) and (4) can then be combined and generalized to the case where assets and liabilities were entered onto the books at time T, yielding the alternative equation (5) specified above.

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FOOTNOTES (cont'd)

22 Fraud and the quality of management are also determinants of profits, but are more difficult to predict than the factors mentioned in the text.

23 For attempts to do so, see Kane (1985) and Barth, Brumbaugh, Sauerhaft and Wang (1985a).

24 Actually, in the case of a liquidation the relevant liabilities are only those that are insured. At year-end 1985, 76 percent of all liabilities were insured. An additional 8 percent of liabilities were borrowed from the Federal Home Loan Banks. It should be noted, moreover, that the relatively short term to maturity of most liabilities means that their book and market values are close to one another. The major factor in explaining divergences between book and market value measures of net worth, in other words, is tne asset side of a thrift's balance sheet.

25 To the extent that firms other than thrifts can only enter the thrift industry by acquiring troubled thrifts, permitting such firms to bid on troubled thrifts should lower the costs to the FSLIC. However, such an action also depresses the market value of net worth for existing thrifts. The existence of nonbank banks is likely to both raise costs and depress market value net worth for existing thrifts. For a discussion of social versus private costs in this context, see Guttentag and Herring (1982).

26 Other information about our sample that may be interesting is as follows:

Type of Failure	Number of Failures	Mean	Standard Deviation	Maximum	Minimum
Federally Chartered	185				
Cost		8.3	43.4	559.7	0
Total Assets		188.3	422.6	3,997.0	4.9
GAAP Net Worth		-3.8	16.8	38.2	-137.4
State-Chartered	139				
Cost		9.8	37.8	330.5	0
Total Assets		143.7	253.2	2,017.8	2.3
GAAP Net Worth		-2.4	20.0	32.2	-192.2
Stock	65				
Cost		18.3	53.4	330.5	0
Total Assets		163.3	252.9	1,231.3	9.4
GAAP Net Worth		-2.7	16.5	32.2	-104.5
Mutual	259				
Cost		6.6	37.1	559.7	0
Total Assets		170.6	382.6	3,997.0	2.3
GAAP Net Worth		-3.3	18.6	38.2	-192.2

Note: All dollar figures are in millions.

FOOTNOTES (cont'd)

27 The cost figures used here represent FSLIC's estimates of the resolution cost. However, to the extent that merger bids are accepted, the costs reflect an agreed-upon market transaction. In the case of liquidations, bids are either not made or, if made, not accepted. See also the note to Table 2.

28 As mentioned above, there are a large number of institutions that are open but insolvent. It has been suggested that because our estimated coefficients are based only on those insolvent institutions that have been closed, the coefficients may be biased. This would be true only to the extent that currently operating insolvent institutions have different characteristics from those in our sample. There is no a priori reason to believe that this is the case.

29 The model estimated uses cross-sectional data over a four-year period, although strictly speaking, equation (5) is specified for time-series data.

30 For a discussion of this issue, see Maddala (1986, pp. 7-8). See also Cassidy (1980, p. 14).

31 See Maddala (1986, p. 6).

32 Unlike AHK (1985), who found only 1 out of 17 explanatory variables to be significant, we find many more significant variables for thrift institutions.

33 Until now, commercial banks have been subjected to capital requirements based upon GAAP. Due to widespread problems at agricultural banks, however, it has recently been proposed that selected commercial banks be permitted to adopt accounting rules that would deviate from GAAP. See Gajewski and Meekhof (1986).

34 The rule does not apply in practice to federally chartered thrifts since they are not permitted under federal law to undertake direct investments in excess of 3 percent of assets. Unless extended through a new rule-making procedure, this rule is scheduled to expire on January 1, 1987. For a more complete discussion of this rule and the controversy surrounding it, see Committee on Government Operations (1985).

35 "Charter value" can also be estimated from Table 2 as the difference between liquidation cost and actual resolution cost. In 1985, the assets of FSLIC-assisted failures were $6,676,841,000. The estimated liquidation cost for the institutions was $1,508,479,000 and the actual resolution cost was $948,698,000. The difference between these is $559,781,000, implying that the "charter value" of these institutions was 8.4 percent of assets. (In cases where a liquidation was less expensive than a merger, the "charter value" is zero.)

36 For additional factors that are likely to be embodied in the intercept term a, see Loeys (1983, p. 25).

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FOOTNOTES (cont'd)

37 See Barth, Brumbaugh, Sauerhaft and Wang (1985b, p. 32, Table A-7).

38 For a general discussion of this and related issues see Carron (1982, 1983, 1984); Cluff, Garcia, and Yeats (1985); Flannery (1985); Greenbaum (1985); Horvitz (1983); Merrick and Saunders (1985); and Mingo (1981).

REFERENCES

Altman, Edward I. "Predicting Performance in the Savings and Loan Association Industry," Journal of Monetary Economics, October 1977, pp. 443-466.

Avery, Robert B., and Hanweck, Gerald A. "A Dynamic Analysis of Bank Failures," Bank Structure and Competition, Federal Reserve Bank of Chicago, 1984, pp. 380-395.

Avery, Robert B.; Hanweck, Gerald A.; and Kwast, Myron L. "An Analysis of Risk-Based Deposit Insurance for Commercial Banks," Bank Structure and Competition, Federal Reserve Bank of Chicago, 1985, pp. 217-250.

Balderston, Frederick E. Thrifts in Crisis: Structural Transformation of the Federal Savings and Loan Industry (Cambridge: Ballinger Publishing Company, 1985).

Barth, James R.; Bisenius, Donald J.; Brumbaugh, R. Dan, Jr.; and Sauerhaft, Daniel, "Regulation and the Thrift Industry Crisis," mimeo, May 1986.

Barth, James R.; Brumbaugh, R. Dan, Jr.; Sauerhaft, Daniel; and Wang, George H.K. (1985a) "Thrift-Institution Failures: Causes and Policy Issues," Bank Structure and Competition, Federal Reserve Bank of Chicago, 1985, pp. 184-216.

Barth, James R.; Brumbaugh, R. Dan, Jr.; Sauerhaft Daniel; and Wang, George H.K. (1985b) "Insolvency and Risk-Taking in the Thrift Industry: Implications for the Future," Contemporary Policy Issues, Fall 1985, pp. 1-32.

Benston, George J. "Financial Disclosure and Bank Failure," Economic Review, Federal Reserve Bank of Atlanta, March 1984, pp. 5-12.

Benston, George J. An Analysis of the Causes of Savings and Loan Association Failures, Monograph Series in Finance and Economics 1985-45, New York University.

Benston, George J., and Kaufman, George G., "Risks and Failures in Banking: Overview, History, and Evaluation," mimeo, December 1985.

Benston, George J.; Eisenbeis, Robert A.; Horvitz, Paul M.; Kane, Edward J.; and Kaufman, George G. Perspectives on Safe and Sound Banking, MIT Press, 1986.

Bierwag, G. O., and Kaufman, George G. "A Proposal for Federal Deposit Insurance with Risk Sensitive Premiums," Bank Structure and Competition, Federal Reserve Bank of Chicago, 1983, pp. 223-242.

Bovenzi, John F.; Marino, James A.; and McFadden, Frank E. "Commercial Bank Failure Predictions Models," Economic Review, Federal Reserve Bank of Atlanta, November 1983, pp. 14-26.

Brewer, Elijah III., and Garcia, Gillian G., "A Logit Analysis of Insolvent S&L Recovery or Merger," Paper presented at the American Economic Association Meetings, New York City, New York, December 1985.

BEST COPY AVAILABLE

REFERENCES (cont'd)

Buser, Stephen A.; Chen, Andrew H.; and Kane, Edward J. "Federal Deposit Insurance, Regulatory Policy, and Optimal Bank Capital," The Journal of Finance, March 1981, pp. 51-60.

Carron, Andrew S. The Plight of the Thrift Institutions, The Brookings Institution, Washington, D.C., 1982.

Carron, Andrew S. The Rescue of the Thrift Industry, The Brookings Institution, Washington, D.C., 1983.

Carron, Andrew S. Reforming the Bank Regulatory Structure, The Brookings Institution, Washington, D.C., 1984.

Cassidy, Henry J. "An Approach for Determining the Capital Requirement for Savings and Loan Associations," Research Working Paper No. 97, Office of Policy and Economic Research, Federal Home Loan Bank Board, Washington, D.C., May 1980.

Cluff, Laurence; Garcia, Gillian; and Yeats, Kevin. "S&L Restructuring: 1977-1984," mimeo, September 1985.

Committee on Government Operations, Federal Regulation of Direct Investments By Savings and Loan Associations, House Report 99-358, U.S. Government Printing Office, November 5, 1985.

Flannery, Mark J. "Deposit Insurance Creates a Need for Bank Regulation," Business Review, Federal Reserve Bank of Philadelphia, January/February 1982, pp. 17-27.

Flannery, Mark J., and Protopapadakis, Aris A. "Risk-Sensitive Deposit Insurance Premia: Some Practical Issues," Business Review, Federal Reserve Bank of Philadelphia, September/October 1984, pp. 3-10.

Flannery, Mark J. "Recapitalizing the Savings and Loan Industry," presented at the Eleventh Annual Conference of the Federal Home Loan Bank of San Francisco, December 1985.

Gajewski, Gregory, and Meekhof, Ronald. "Bankers Dream While Regulators Adjust the Rules," Choices, Second Quarter 1986, pp. 35-37.

Gray, Edwin J. "Statement Before the Committee on Banking, Housing and Urban Affairs, United States Senate," March 13, 1986.

Greenbaum, Stuart I. "Reform of the Thrift Industry," Banking Research Center Working Paper No. 123, March 1985.

Guttentag, Jack, and Herring, Richard. "The Insolvency of Financial Institutions: Assessment and Regulatory Deposition," in Paul Wachtel (ed.) Crises in the Economic and Financial Structure (Lexington and Toronto: D.C. Heath and Company, 1982), pp. 99-126.

BEST COPY AVAILABLE

REFERENCES (cont'd)

Hess, Alan C. "Are Thrifts Worth Saving?" presented at the Carnegie-Rochester Conference, Rochester, New York, April 1986.

Horvitz, Paul M. "Deposit Insurance After Deregulation: A Residual Role for Regulation," A Paper Prepared for the Ninth Annual Conference of the Federal Home Loan Bank of San Francisco, December 1983a.

Horvitz, Paul M. "The Case Against Risk-Related Deposit Insurance Premiums," Housing Finance Review, July 1983, pp. 253-264.

Horvitz, Paul M., and Pettit, R. Richardson. "Short-Run Financial Solutions for Troubled Thrift Institutions," The Future of the Thrift Industry, Federal Reserve Bank of Boston, Conference Series No. 24, October 1981, pp. 44-67.

Horvitz, Paul M. "A Reconsideration of the Role of Bank Examination," Journal of Money, Credit and Banking, November 1980, pp. 654-659.

Kane, Edward J. The Gathering Crisis in Federal Deposit Insurance, MIT Press, 1985.

Kane, Edward J. "A Six-Point Program for Deposit Insurance Reform," Housing Finance Review, July 1983, pp. 269-278.

Kane, Edward J. "S&Ls and Interest-Rate Reregulation: The FSLIC as an In-Place-Bailout Program," Housing Finance Review, July 1982, pp. 219-243.

Kareken, John H. (1983a) "Deposit Insurance Reform or Deregulation is the Cart, Not the Horse," Quarterly Review, Federal Reserve Bank of Minneapolis, Spring 1983, pp. 1-9.

Kareken, John H. (1983b) "The First Step in Bank Deregulation: What About the FDIC?" American Economic Review, May 1983, pp. 198-203.

Kareken, John H., and Wallace, Neil, "Deposit Insurance and Bank Regulation: A Partial Equilibrium Exposition," Journal of Business, July 1978, pp. 413-452.

Kareken, John H. "Deregulating Commercial Banks: The Watchword Should Be Caution," Quarterly Review, Federal Reserve Bank of Minneapolis, Spring-Summer 1981, pp. 1-5.

Kaufman, George G. "Implications of Large Bank Problems and Insolvencies for the Banking System and Economic Policy," in Issues in Bank Regulation, Winter 1985, pp. 35-42.

Loeys, Jan G. "Deregulation: A New Future for Thrifts," Business Review, Federal Reserve Bank of Philadelphia, January-February, 1983, pp. 15-26.

BEST COPY AVAILABLE

REFERENCES (cont'd)

Lucas, Robert E. "Econometric Policy Evaluation: A Critique," The Phillip Curve and Labor Markets. Eds. Karl Brunner and Alan H. Meltzer. The Carnegie-Rochester Conference on Public Policy, a supplementary series to the Journal on Monetary Economics. Volume 1 Amsterdam: North Holland 1976.

Maddala, G. S. "Some Problems in the Econometric Analysis of Thrift Institution Failures," mimeo, March 1986.

Maddala, G. S. Limited Dependent and Qualitative Variables in Econometrics, Cambridge University Press, 1983.

Maisel, Sherman J., "Risk and Capital Adequacy in Banks," The Regulation of Financial Institutions, Federal Reserve Bank of Boston, Conference Series No. 21, October 1979, pp. 203-224.

Marcus, Alan J., and Shaked, Israel. "The Valuation of FDIC Deposit Insurance Using Option-pricing Estimates," Journal of Money, Credit and Banking, November 1984, pp. 446-460.

Martin, Daniel. "Early Warning of Bank Failure: A Logit Regression Approach," Journal of Banking and Finance, November 1977, pp. 249-276.

McCulloch, J. Huston. "Interest Risk Sensitive Deposit Insurance Premia: Stable ACH Estimates," Journal of Banking and Finance, March 1985, pp. 137-156.

Merrick, John J., Jr., and Saunders, Anthony. "Bank Regulation and Monetary Policy," A Paper Prepared for the American Enterprise Institute's Conference on Monetary Policy in a Changing Environment, Washington, D.C., February 1985.

Merton, Robert C. "Discussion," The Regulation of Financial Institutions, Federal Reserve Bank of Boston, Conference Series No. 21, October 1979, pp. 256-263.

Meyer, Paul A., and Pifer, Howard W. "Prediction of Bank Failures." The Journal of Finance, September 1970, pp. 853-868.

Mingo, John J. "Short-Run Structural Solutions to the Problems of Thrift Institutions," The Future of the Thrift Industry, Federal Reserve Bank of Boston, Conference Series No. 24, October 1981, pp. 81-106.

Pettway, Richard H., and Sinkey, Joseph F., Jr. "Establishing On-Site Bank Examination Priorities: An Early-Warning System Using Accounting and Market Information," The Journal of Finance, March 1980, pp. 137-150.

Pyle, David H. "Pricing Deposit Insurance: The Effects of Mismeasurement," mimeo, October 1983.

BEST COPY AVAILABLE

REFERENCES (cont'd)

Santomero, Anthony, and Vinso, Joseph. "Estimating the Probability of Failure for Commercial Banks and the Banking System," Journal of Banking and Finance, October 1977, pp. 185-205.

Scott, Kenneth E., and Mayer, Thomas. "Risk and Regulation in Banking: Some Proposals for Federal Deposit Insurance Reform," Stanford Law Review, May 1971, pp. 537-582.

Sinkey, Joseph F. "A Multivariate Statistical Analysis of the Characteristics of Problem Banks," The Journal of Finance, March 1975, pp. 21-36.

Sinkey, Joseph F. "Identifying 'Problem' Banks: How Do the Banking Authorities Measure a Bank's Risk Exposure?" Journal of Money, Credit and Banking, May 1978, p. 184-193.

Sinkey, Joseph F., and Walker, David A. "Problem Banks: Identification and Characteristics," Journal of Bank Research, Winter 1975, pp. 209-217.

Swamy, P.A.V.B.; Barth, J.R.; and Tinsley, P.A. "The Raticnal Expectations Approach to Economic Modelling," Journal of Economic Dynamics and Control, May 1982, pp. 125-147.

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